

Serial No. 10/705,572
Response date June 19, 2006
Reply to Office Action of January 31, 2006

REMARKS

Status of claims

Applicants thank the Examiner for the consideration given to the present application. Claim 4 has been canceled without prejudice. Claims 1, 3, 6, 7, 9, 12, and 13 have been amended to correct several informalities. Support for the amendment is found in the specification and figures, and thus no new matter has been entered in the claims. Claims 1-3, 5-9, and 11-18 are pending in the present application.

Objection to the Claims

Claims 3-4, 6-7, 9, 12, and 13 are objected to because of the following informalities: abbreviations BRI, VRI, F-VLR, F-BLR, and ORP should be fully written out. Accordingly, claims 3, 6-7, 9, 12, and 13 have been amended to correct these informalities, and claim 4 has been canceled without prejudice. Thus, Applicants respectfully request the objection to these claims be withdrawn.

Rejection of The Claims under 35 U.S.C. §102 and §103

Claims 7, 13, and 17-18 have been rejected under 35 U.S.C. §102(b) as being anticipated by Koslow, U.S. Patent No. 6,630,016. Claims 1, 3-4, and 16 have been rejected under 35 U.S.C. §102(e) as being anticipated by Jagtoyen et al., Pub. No. US 2004/0040906. Claim 2 has been rejected under 35 U.S.C. §103(a) as being obvious over Jagtoyen as applied to Claim 1, and further in view of Chesneau et al., Pub. No. US 2002/0172637. Claim 5 has been rejected under 35 U.S.C. §103(a) as being obvious over Jagtoyen as applied to Claim 1, and further in view of Judd et al., U.S. Patent No. 5,376,279. Claim 6 has been rejected under 35 U.S.C. §103(a) as being obvious over Jagtoyen as applied to Claim 1, and further in view of Koslow and Denkewicz, Jr. et al., U.S. Patent No. 5,772,896. Claim 8 has been rejected under 35 U.S.C. §103(a) as being obvious over Koslow as applied to Claim 7, and further in view of Chesneau. Claims 9 and 14-15 have been rejected under 35 U.S.C. §103(a) as being obvious over Koslow as applied to Claims 7 and 13, and further in view of Jagtoyen. Claim 11 has been rejected under 35 U.S.C. §103(a) as being obvious over Koslow as applied to Claim 7, and further in view of

Serial No. 10/705,572
Response date June 19, 2006
Reply to Office Action of January 31, 2006

Judd et al., U.S. Patent No. 5,376,279. Claim 12 has been rejected under 35 U.S.C. §103(a) as being obvious over Koslow as applied to Claim 7, and further in view of Denkwicz, Jr. et al.

Applicants respectfully traverse the rejection of the claims and submit that none of the references, singularly or in combination, teach or suggest a filter formed from **mesoporous** activated carbon filter particles (defined as activated carbon particles with a sum of mesopore and macropore volumes of greater than 0.12 mL/g), wherein a portion of the mesoporous particles is partially coated with silver, and wherein the filter has a **Filter Bacteria Log Removal (F-BLR)** of greater than about 2 logs, and a **Filter Viruses Log Removal (F-VLR)** of greater than about 1 log. Under 35 USC §102, a single prior art reference must, either expressly or inherently, teach each and every element of the claims. MPEP 2131. Moreover, in order to establish a prima facie case of obviousness under §103, the Examiner has the burden of showing, by reasoning or evidence, that: 1) there is some suggestion or motivation, either in the references themselves or in the knowledge available in the art, to modify that reference's teachings; 2) there is a reasonable expectation on the part of one of ordinary skill in the art that the modification or combination has a reasonable expectation of success; and 3) the prior art references (or references when combined) teach or suggest all the claim limitations. MPEP §2145.

Applicants' independent claims 1 and 7 recite a filter comprising, *inter alia*, a filter material formed at least in part from a plurality of **mesoporous activated carbon filter particles**, wherein a portion of the mesoporous carbon filter particles is coated with silver or a silver containing material, wherein the filter has a **Filter Bacteria Log Removal (F-BLR)** of greater than about 2 logs, and a **Filter Viruses Log Removal (F-VLR)** of greater than about 1 log. Applicants' independent claim 13 recites a filter comprising, *inter alia*, a filter material formed at least in part from a plurality of **mesoporous activated carbon filter particles** and **other material** coated with silver, wherein the filter has a **Filter Bacteria Log Removal (F-BLR)** of greater than about 2 logs and a **Filter Viruses Log Removal (F-VLR)** of greater than about 1 log. Applicants' specification defines "mesoporous activated carbon filter particles" as activated carbon filter particles wherein the sum of the mesopore and macropore volumes may be greater than 0.12 mL/g, and "microporous activated carbon filter particles" as activated carbon filter particles wherein the sum of the mesopore and macropore volumes may be less than 0.12 mL/g. In addition, Applicants' specification further defines "mesopore" as an intra-particle pore

Serial No. 10/705,572

Response date June 19, 2006

Reply to Office Action of January 31, 2006

having a width or diameter between 2 nm and 50 nm, and "macropore" as an intra-particle pore having a width or diameter greater than 50 nm.

The Examiner asserts that Koslow teaches a filter material formed in at least in part from a plurality of mesoporous activated carbon filter particles (col. 2, lines 1-14), wherein the mesoporous activated carbon particles are coated with silver (col. 7, lines 22-11). Applicants respectfully disagree with this assertion. In column 2, lines 1-14, Koslow teaches providing active particles having an **average particle size** of about 0.1 microns to about 5,000 microns and forming the treated active particles into a **microporous** structure having a **mean flow path** (between the filter particles) of less than about 2 microns. (col. 2, lines 1-14; see also the Title). Applicants submit that Koslow's teaching of the **average particle size** refers to the particle size itself and not the claimed **intra-particle pore mesoporous pore volume** as recited in claims 1, 7, and 13. As set forth above, the claim term "mesoporous activated carbon particles" has a clearly defined meaning of activated carbon particles with a sum of **mesopore** (intra-particle pore volume) and **macropore** (intra-particle pore volume) **volumes of greater than 0.12 mL/g**. Applicants further submit that Koslow's teaching of average mean flow path is directed to the spacing between the particles, not the volume of the pores within a particle. In fact, the Examiner acknowledged that Koslow does not disclose the mesoporous or macroporous pore volumes. (Office Action, par. 9). As such, Koslow cannot, and does not, teach or suggest Applicants' claimed mesoporous activated carbon filter particles, which are defined as having a sum of mesopore and macropore volume of greater than 0.12 mL/g.

In addition, Applicants respectfully submit that Koslow teaches filter particles comprising a **microbiological interception enhancing agent** comprising a **cationic material** that is first coated onto the activated carbon particles and then a **biologically active metal** (e.g., silver) is precipitated onto the cationic material in order to achieve its efficacy as a filter (col. 1, lines 52-60). In contrast, Applicants' invention **requires no intermediate cationic polymer** to achieve its F-BLR and F-VLR values. In other words, Applicants' claimed filter requires no such additional aids as taught by Koslow. Applicants' invention coats the silver directly onto the mesoporous activated carbon particles, which is clearly not taught or suggested by Koslow. Therefore, Applicants respectfully submit that Koslow does not teach or suggest, explicitly or inherently, a filter formed from **mesoporous activated carbon filter particles** (as defined) and

Serial No. 10/705,572

Response date June 19, 2006

Reply to Office Action of January 31, 2006

either mesoporous activated carbon filter particles partially coated with silver or other material coated with silver, let alone a filter formed from such mesoporous activated carbon filter particles and silver that has a **Filter Bacteria Log Removal (F-BLR)** of greater than about 2 logs, and a **Filter Viruses Log Removal (F-VLR)** of greater than about 1 log as recited by Applicants' independent claims 1, 7, and 13.

In order to overcome the lack of teaching in Koslow regarding mesoporous and macroporous volumes, the Examiner alleges Chesneau et al. teach a filter, wherein the sum of the mesopore and macropore volumes is between about 0.2 mL/g and 2 mL/g. (par. 35). However, the Applicants respectfully submit that although Chesneau et al. teach a mesopore volume of at least 0.3 mL/g, Chesneau et al. is silent as to whether macropores are even present within their filter material. Also, Chesneau et al. do not teach or even suggest using mesoporous activated carbon particles to form a filter that is configured to remove bacteria or viruses, let alone at the claimed F-BLR and an F-VLR levels. Actually, Chesneau et al. teach away from Applicants' invention as they teach bacteria attach only to macropores, and not to mesopores. (par. 4).

Rather, Applicants submit that Chesneau et al. teach an activated carbon filter that operates in a biological mode. A biological mode filter is a filter wherein the carbon material acts as a support for bacteria that can decompose biodegradable organic matter in the water to be treated. (par. 4). Nowhere does Chesneau et al. teach or suggest that their filter is configured to remove (or is even capable of removing) bacteria or viruses, particularly at the claimed F-BLR and F-VLR levels. Chesneau et al. disclose that the "attachment of the bacteria to the carbon-containing material and their growth thereon are made possible by providing suitable macropores, not mesopores. (Id.).

Moreover, Chesneau et al. also disclose that the presence of micropores and mesopores permits the filter to operate conventionally to absorb organic and inorganic pollutants such as detergents, pesticides, herbicides, trace metals, polycyclic aromatic hydrocarbons, organic compounds of low solubility, chlorinated derivatives, colored or odorous entities, humic acids, and the like. (par. 4 - par. 5). As clearly shown, Chesneau et al. is void of any teaching or suggestion that their filter is configured to remove bacteria or viruses, particularly at the F-BLR and F-VLR values claimed. Therefore, Chesneau et al., singularly or in combination with Koslow, do not teach or suggest a filter formed from mesoporous activated carbon filter particles

Serial No. 10/705,572

Response date June 19, 2006

Reply to Office Action of January 31, 2006

(as defined). Moreover, Applicants submit that Chesneau et al., singularly or in combination with Koslow, do not teach or suggest a filter formed from mesoporous activated carbon filter particles and either mesoporous activated carbon filter particles or other materials coated with silver coated with silver, wherein the filter has an F-BLR of greater than 2 logs and F-VLR of greater than 1 log as recited in independent claims 1, 7, and 13.

The Examiner also alleges that Jagtoyen et al. teach a filter material formed in at least in part from a plurality of mesoporous activated carbon filter particles, wherein the filter material has an F-BLR of greater than about 2 logs and an F-VLR of greater than about 1 log. However, Applicants respectfully submit that the teachings of Jagtoyen et al. have been misunderstood. (par. 96, Tables 6-7, and Table 2-3). In paragraph 96, Jagtoyen et al. teach a composite fiber having a micropore volume of 0.37 - 0.51 cc/g, no macropores, and low mesopore volume. (para. 96, Jagtoyen et al.). Applicants submit that the activated carbon particles having a low mesopore volume and zero macropore volume taught by Jagtoyen et al. are considered **microporous** activated carbon particles, **not mesoporous** activated carbon particles as defined within the specification and claimed by the Applicants.

In support, Applicants point to their specification that defines "microporous activated carbon filter particles" as activated carbon filter particles having a sum of mesopore and macropore volumes of **less than 0.12 mL/g**, and "mesoporous activated carbon filter particles" as activated carbon filter particles having a sum of mesopore and macropore volumes of **greater than 0.12 mL/g**. (p. 9, lines 20-23 and lines 17-19, respectively). Applicants further submit that it is generally accepted that **microporous** activated carbon filter particles include **low mesopore volumes**, generally **less than 0.1 mL/g** such as the coconut carbon shown in Applicants' Figures 7a and 7b. This coconut carbon filter material comprises microporous activated carbon filter particles having, for example, mesopore volumes of less than 0.09 mL/g. Thus, Jagtoyen et al's low mesopore (i.e., less than 0.1 mL/g) and zero macropore (i.e. 0 mL/g) activated carbon particles would teach a sum of mesopore and macropore volumes of less than 0.1 mL/g (0.1 mL/g + 0 mL/g), which **definitely does not teach or suggest Applicants' mesoporous activated carbon particles** as defined and claimed.

Moreover, since Jagtoyen et al. do not teach or suggest mesoporous activated carbon particles, then Jagtoyen et al. definitely do not teach or suggest a filter formed from mesoporous

Serial No. 10/705,572

Response date June 19, 2006

Reply to Office Action of January 31, 2006

activated carbon particles and either mesoporous activated carbon particles or other materials coated with silver, and wherein the filter has a **Filter Bacteria Log Removal** of greater than about 2 logs and a **Filter Viruses Log Removal** of greater than about 1 log as claimed by Applicants. First, Jagtoyen et al. is void of any teaching regarding coating mesoporous activated carbon particles or any other material with silver. Second, as set forth above, Jagtoyen et al. teach a low mesopore and no macropore activated carbon, not mesoporous activated carbon particles as claimed by Applicants. Third, in teaching the use of a low mesopore and no macropore activated carbon particles (i.e., microporous activated carbon particles) to form a filter material to remove microorganisms from water, Applicants submit that Jagtoyen et al. teach away from forming a filter using mesoporous activated carbon particles to remove bacteria and viruses from water at the F-BLR and F-VLR values claimed by Applicants.

Fourth, Applicants' claimed F-BLR of greater than 2 logs and F-VLR of greater than 1 log refer to the filter's bacteria and virus removal capability after the passing of the first 2,000 filter material pore volumes. Jagtoyen et al.'s Tables 1-3 and 6-7 do not teach or suggest such F-BLR and F-VLR values after the first 2,000 filter material pore volumes. Jagtoyen et al.'s Table 2 teaches bacteria log removal values at a maximum flow rate of 10 columns/hour, which equates to approximately 4.3 filter material pore volumes per hour (using a typical filter bed porosity of 0.43), and for a maximum time period of 28.9 hours. To compare this to Applicants' claimed 2,000 filter material pore volumes the 4.3 filter material pores volumes per hour must be multiplied by the 28.9 hours to arrive at the value of 124 filter material pore volumes. Jagtoyen et al.'s Table 3 teaches bacteria log removal values at a maximum flow rate of 10 columns/hour, which equates to approximately 4.3 filter material pore volumes per hour, and for a maximum time period of 20 minutes. To compare this to Applicants' claimed 2,000 filter material pore volumes the 4.3 filter material pores volumes per hour must be multiplied by the .333 hours (20 minutes converted to hours) to arrive at the value of 1.4 filter material pore volumes. Jagtoyen et al.'s Table 6 teaches bacteria log removal values at a maximum flow rate of 8.8 columns/hour, which equates to approximately 3.78 filter material pore volumes per hour, and for a maximum time period of 6 hours. To compare this to Applicants' claimed 2,000 filter material pore volumes the 3.78 filter material pores volumes per hour must be multiplied by the 6 hours to arrive at the value of 22.7 filter material pore volumes. Jagtoyen et al.'s Table 7 teaches bacteria

Serial No. 10/705,572

Response date June 19, 2006

Reply to Office Action of January 31, 2006

log removal values at a maximum flow rate of 67 columns/hour, which equates to approximately 28.8 filter material pore volumes per hour, and for a maximum time period of 9.5 minutes. To compare this to Applicants' claimed 2,000 filter material pore volumes the 28.8 filter material pores volumes per hour must be multiplied by the 0.16 hours (9.5 minutes converted to hours) to arrive at the value of 4.56 filter material pore volumes. Thus, Jagtoyen et al.'s Tables 2, 3, 6, and 7 only teach a filter that has a bacteria log removal for only a maximum of 124, 1.4, 22.7, and 4.56 filter material pore volumes, respectively, which are significantly lower than and do not come close to Applicants' claimed F-BLR and F-VLR values after the first 2,000 material pore volumes. Thus, Jagtoyen et al.'s tables do not teach Applicants' claimed F-BLR and F-VLR values. Accordingly, Applicants submit that Jagtoyen et al., singularly or in combination with Koslow and/or Chesneau et al., do not teach or suggest a filter formed from **mesoporous activated carbon** filter particles (as defined), let alone a filter formed from mesoporous activated carbon filter particles combined with either **mesoporous activated carbon** particles or **other material coated with silver**, and wherein the filter that has an F-BLR of greater than about 2 logs and a F-VLR of greater than about 1 log as recited by Applicants' independent claims 1, 7, and 13.

Applicants further submit that the remaining applied references (Judd et al. or Denkewicz, Jr. et al.) are void of any teaching or suggestion regarding mesoporous activated carbon filter particles, mesoporous activated carbon filter particles combined with silver coatings, and F-BLR and F-VLR values. Therefore, none of the references (Koslow, Chesneau et al, and/or Jagtoyen et al., Judd et al., and/or Denkewicz, Jr. et al.), singularly or in combination, teach or suggest a filter formed in part from **mesoporous activated carbon** and either mesoporous activated carbon or **other material coated with silver**, wherein the filter made from the filter material has an F-BLR of greater than 2 logs and F-VLR greater than 1 log as claimed in independent claims 1, 7, and 13. Accordingly, Applicants respectfully request the rejections under 35 U.S.C. §102 and §103 of independent claims 1, 7, and 13 be withdrawn. As claims 2, 3, 5, 6, 8, 9, 11, 12, and 14-18 depend from claims 1, 7, or 13, Applicants request the rejections under 35 U.S.C. §102 and §103 of these claims be withdrawn as well.

Serial No. 10/705,572
Response date June 19, 2006
Reply to Office Action of January 31, 2006

CONCLUSION

Applicants respectfully submit that the present application is in condition for allowance. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,
DINSMORE & SHOHL L.L.P.

By



Paul M. Ulrich
Registration No. 46,404

One Dayton Centre
One South Main Street, Suite 1300
Dayton, Ohio 45402
Telephone: (937) 449-6400
Facsimile: (937) 449-6405

PMU/tlo